# BROADCAST RECEIVER, CONTROL METHOD THEREFOR, AND PROGRAM

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The present invention relates to broadcast receivers, control methods therefor, and programs, and in particular, to a broadcast receiver, a control method therefor, and a program in which, in a set-top box (STB) or the like, a first-in first-out (FIFO) buffer area, required for separating input transport stream data, can be optimized (minimized in size) in accordance with the bit rate of the input transport stream data.

### 2. Description of the Related Art

In STBs, etc., processing that separates multiplexed transport stream data into various types of data (such as video data and audio data) is performed by hardware. Accordingly, the FIFO buffer (fixed to a size determined by the maximum bit rate of input transport stream data), required to temporarily store input transport stream data, is realized as part of the hardware.

The bit rate of the input transport stream data differs depending on the country, the broadcaster, etc. Accordingly, after using the hardware to determine the design, as described above, when an STB for another destination or another broadcaster is developed, a problem arises in that

since the bit rates of the input transport stream data differ, the hardware design must be substantially modified to achieve optimal size (area) so as to prevent the input transport stream data from overflowing.

SUMMARY OF THE INVENTION

Accordingly, objects of the present invention are to provide a broadcast receiver and a control method therefor in which, when the bit rate of input transport stream data is changed, an FIFO buffer area (size) is optimized (minimized) without changing the hardware design, and to provide a program for the receiver.

To this end, according to an aspect of the present invention, the foregoing objects are achieved through provision of a broadcast receiver for separating multiplexed transport stream data. The broadcast receiver includes a receiving unit for receiving the multiplexed transport stream data, a memory for storing the received transport stream data, a processing unit which determines an optimal buffer size in accordance with a bit rate of the transport stream data received by the receiving unit and which reserves, in the memory, a storage area having the determined size, and a demultiplexer for performing separation of a transport packet by using the reserved storage area.

According to another aspect of the present invention, the foregoing objects are achieved through provision of a control method for a broadcast receiver for receiving multiplexed transport stream data, for storing the received transport stream data in a memory, and for separating the desired transport packet from the stored transport stream data. The control method includes the steps of determining an optimal buffer size in accordance with a bit rate of the received transport stream data, and reserving, in the memory, a storage area having the determined size. The reserved storage area is used to perform separation of the transport packet.

According to a further aspect of the present invention, the foregoing objects are achieved through provision of a program stored in a storage medium which is executed by a control processor in a broadcast receiver for receiving multiplexed transport stream data, for storing the received transport stream data in a memory, and for separating the desired transport packet from the stored transport stream data. The program includes the steps of determining an optimal buffer size in accordance with a bit rate of the received transport stream data, and reserving, in the memory, a storage area having the determined size.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing the structure of an STB 1 according to an embodiment of the present invention;

Fig. 2 is an illustration of an example of a main memory 14 shown in Fig. 1; and

Fig. 3 is a flowchart illustrating a process performed when a control unit 13 shown in Fig. 1 changes the buffer size based on the bit rate of transport stream data.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Fig. 1 shows the structure of an STB 1 according to an embodiment of the present invention.

A user uses an input unit 11 to perform the desired operations (e.g., the switching-on and resetting of the main power, etc.). The input unit 11 supplies an operation signal to a control unit 13 via a bus 17.

A receiving unit 12 receives externally-supplied multiplexed transport stream data, and supplies the received transport stream data to a main memory 14 via the bus 17. The receiving unit 12 includes a tuner, a decoding circuit, and a correcting circuit.

The main memory 14 includes a program area 21 and a FIFO buffer 22, as shown in Fig. 2. The program area 21 stores a program in which processing to be performed when the STB 1 is booted (the switching-on or resetting of the main power) is described. In the program, a value of the

bit rate of the transport stream data to be input to the receiving unit 12 is described at a predetermined position, and the value of the bit rate can be rewritten as required. Accordingly, when the value of the bit rate to be input is changed, it is only required that the described value of the bit rate be rewritten. The FIFO buffer area 22 temporarily stores the transport stream data supplied from the receiving unit 12. The optimal size (area) of the FIFO buffer area 22 is determined based on the result of arithmetic operation by the control unit 13 (described below).

When the control unit 13 is supplied with the operation signal (a main-power switching-on signal or a reset signal) from the input unit 12, it reads, from the program area 21 of the main memory 14, the bit-rate value of the transport stream data stored beforehand. The control unit 13 computes the optimal size of the FIFO buffer area 22, based on the read bit-rate value, and reserves, in the main memory 14, the FIFO buffer area 22 based on a result of the computation. The transport stream data from the receiving unit 12 is supplied and stored in the FIFO buffer area 22 reserved in the main memory 14. In view of the cost of memory, it is advantageous to set the optimal size of the FIFO buffer area 22 to the minimum necessary value which will prevent the stream data from overflowing.

A demultiplexer unit 15 is supplied with the transport

stream data from the FIFO buffer area 22 of the main memory 14. The demultiplexer unit 15 separates the supplied transport stream data into various types of data (e.g., video data, audio data, etc.), and supplies the separated data to a decoding unit 16 via the bus 17.

Next, a process performed when the control unit 13 determines the optimal size of the FIFO buffer area 22 based on the bit-rate value of the transport stream data is described with reference to the flowchart shown in Fig. 3.

In step S11, when the user switches on or resets the main power by operating the input unit 11, the operation signal (main-power switching-on signal or reset signal) is supplied to the control unit 13 via the bus 17.

In step S12, the control unit 13 reads, via the bus 17, the bit-rate value of the transport stream data stored beforehand in the program area 21 of the main memory 14.

In step S13, the control unit 13 computes, based on the read bit-rate value, the optimal size of the FIFO buffer area 22, and confirms it.

In step S14, the control unit 13 reserves, based on a result of the computation in step S13, the FIFO buffer area 22 in the main memory 14, and the process is terminated.

In the foregoing description, the case where the value of a bit rate of transport stream data is described beforehand in a program is described. By way of example, by

providing a detector for detecting an input bit rate, an optimal FIFO buffer size may be determined by performing the above-described computation based on the value of the bit rate output from the detector.

In the foregoing description, the main memory 14 is used in a form in which it is divided into the program area and the FIFO buffer area. However, a memory for storing a program may be provided separately from the main memory 14. For example, a rewritable nonvolatile flash memory may be used as the memory for storing a program, and a nonvolatile RAM may be used as the memory for the FIFO buffer.

In the present invention, the types of provision media for providing the user with a computer program executing the above-described process include not only information recording media such as magnetic disks and CD-ROMs but also network-based transmission media such as the Internet and digital satellite.

As described above, according to the present invention, based on the bit rate of transport stream data, an optimal buffer size is computed, and based on the result of the computation, the buffer area is changed, whereby memory can be effectively used.